Sonja Loyd

From: Max Forbes
Sent: Monday, February 18, 2008 8:52 AM
To: Sonja Loyd
Subject: RE: LOOP - Outfall 015

Sonja:

On Monday, Feb. 18, 2008, we looked over the most recent activity on the Cormix modeling for the LOOP application. I am satisfied that the input parameters are correct and that the use of the model is appropriate. DEQ attempted to contact LOOP to determine if any changes have occurred in the use of Outfall 015; we have no response on those contacts. Therefore, the model was run using the parameters of 2002. The results of the modeling will be used in the permit for Outfall 015.

The current application specifies that chlorination is being used on this outfall.

Max Forbes 2/18/08

From: Sonja Loyd
Sent: Thursday, February 14, 2008 10:07 AM
To: Max Forbes
Cc: Aimee' Killeen; Scott Guilliams
Subject: LOOP - Outfall 015

Max,

After reviewing the previous CORMIX Model Report for LOOP ran by Steve Tassin, it appears that the previous biomonitoring critical dilution (2.89%) was equivalent to the pollutant concentration. Aimee' prepared a new modeling report using the same input variables (from the previous model) in the updated version of the CORMIX Model. Based on the value calculated for the pollutant concentration in the new report, the critical dilution is 2.80% (after rounding). Attached is copy of the new report for your review and approval. Give me a call at X3090 when you get a chance. I'll be here until 11:30 A.M. on today.

Sonja

<< File: CORMIX Model Report for LOOP 015.pdf >>

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CORMIX SESSION REPORT:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
                      CORMIX MIXING ZONE EXPERT SYSTEM
                          CORMIX Version 5.0GT
                       HYDRO1:Version-5.0.1.0  December,2007
SITE NAME/LABEL:
  DESIGN CASE:                 LOOP
  FILE NAME:                   C:\Program Files\CORMIX 5.0\Loop.prd
  Using subsystem CORMIX1:     Single Port Discharges
  Start of session:            02/14/2008--09:14:23
*****************************************************************************
SUMMARY OF INPUT DATA:
-----------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                            = unbounded
  Average depth                  HA        = 37 m
  Depth at discharge             HD        = 37 m
  Ambient velocity               UA        = 0.04 m/s
  Darcy-Weisbach friction factor F         = 0.0094
    Calculated from Manning's n            = 0.02
  Wind velocity                  UW        = 0 m/s
  Stratification Type            STRCND = A
  Surface density                RHOAS  = 1005 kg/m^3
  Bottom density                 RHOAB  = 1008 kg/m^3
-----------------------------------------------------------------------------
DISCHARGE PARAMETERS:            Single Port Discharge
  Nearest bank                             = left
  Distance to bank               DISTB  = 25000 m
  Port diameter                  D0        = 0.254 m
  Port cross-sectional area      A0        = 0.0507 m^2
  Discharge velocity             U0        = 3.74 m/s
  Discharge flowrate             Q0        = 0.189509 m^3/s
  Discharge port height          H0        = 12.20 m
  Vertical discharge angle       THETA  = 90 deg
  Horizontal discharge angle     SIGMA  = 0 deg
  Discharge density              RHO0   = 999 kg/m^3
  Density difference             DRHO   = 8.0108 kg/m^3
  Buoyant acceleration           GP0    = 0.078 m/s^2
  Discharge concentration        C0     = 100 %
  Surface heat exchange coeff.   KS     = 0 m/s
  Coefficient of decay           KD     = 0 /s
-----------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.23 m         Lm  = 21.05 m        Lb  = 231.00 m
  LM  = 6.35 m         Lm' = 5.47 m        Lb' = 5.08 m
-----------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
  Port densimetric Froude number  FR0    = 26.57
  Velocity ratio                  R      = 93.5
-----------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                          = no
  Water quality standard specified         = no
  Regulatory mixing zone                   = yes
  Regulatory mixing zone specification     = distance
  Regulatory mixing zone value             = 30.48 m (m^2 if area)
  Region of interest                       = 5000 m
*****************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *------------------------*
  | FLOW CLASS   = S2 |
  *------------------------*
  This flow configuration applies to a layer corresponding to the linearly
  stratified density layer at the discharge site.
  Applicable layer depth = water depth = 37 m
*****************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

-----------------------------------------------------------------------------
X-Y-Z Coordinate system:
  Origin is located at the bottom below the port center:
    25000 m from the left bank/shore.
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  Number of display steps NSTEP = 12 per module.
-------------------------------------------------------------------------------
NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no regulatory
  implication.  However, this information may be useful for the discharge
  designer because the mixing in the NFR is usually sensitive to the
  discharge design conditions.
  Pollutant concentration at NFR edge  c = 2.8569 %
  Dilution at edge of NFR              s = 35.0
  NFR Location:                        x = 26.76 m
    (centerline coordinates)           y = 0 m
                                       z = 26.54 m
  NFR plume dimensions:  half-width (bh) = 41.13 m
                          thickness (bv) = 2.02 m
Cumulative travel time:       588.1168 sec.
-------------------------------------------------------------------------------
Buoyancy assessment:
  The effluent density is less than the surrounding ambient water
  density at the discharge level.
  Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
  the surface.
-------------------------------------------------------------------------------
Stratification assessment:
  The specified ambient density stratification is dynamically important.
  The discharge near field flow is trapped within the linearly stratified
  ambient density layer.
-------------------------------------------------------------------------------
UPSTREAM INTRUSION SUMMARY:
Plume exhibits upstream intrusion due to low ambient velocity or strong
  discharge buoyancy.
  Intrusion length                        =  20.81 m
  Intrusion stagnation point              =  -14.62 m
  Intrusion thickness                     =  3.42 m
  Intrusion half width at impingement     =  41.13 m
  Intrusion half thickness at impingement =  2.02 m
-------------------------------------------------------------------------------
PLUME BANK CONTACT SUMMARY:
  Plume in unbounded section does not contact bank in this simulation.
********************** TOXIC DILUTION ZONE SUMMARY ************************
No TDZ was specified for this simulation.
********************** REGULATORY MIXING ZONE SUMMARY *********************
The plume conditions at the boundary of the specified RMZ are as follows:
  Pollutant concentration              c = 2.795883  %
  Corresponding dilution               s = 35.8
  Plume location:                      x = 30.48 m
    (centerline coordinates)           y = 0 m
                                       z = 26.54 m
  Plume dimensions:       half-width (bh) = 44.84 m
                           thickness (bv) = 1.89 m
Cumulative travel time:       681.0200 sec.
********************** FINAL DESIGN ADVICE AND COMMENTS ********************
REMINDER:  The user must take note that HYDRODYNAMIC MODELING by any known
  technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the
  CORMIX predictions on dilutions and concentrations (with associated
  plume geometries) are reliable for the majority of cases and are accurate
  to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges
  the design configuration as highly complex and uncertain for prediction.
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